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CLAIMS

1. A method of wireless communications using a transceiver having a receiver and transmitter, comprising:

programming one of the receiver and the transmitter;

receiving a first signal at the receiver from a wireless source; and

transmitting a second signal from the transmitter into space.

2. The method of claim 1 wherein the transmission of the second signal comprises filtering the second signal with a filter, and the programming comprises programming a frequency band of the filter.

3. The method of claim 1 wherein the transmission of the second signal comprises amplifying the second signal with an amplifier, and the programming comprises programming gain of the amplifier.

4. The method of claim 1 wherein the transmission of the second signal comprises filtering the second signal with a filter and amplifying the filtered second signal with an amplifier, and wherein the programming comprises programming a frequency band of the filter and programming gain of the amplifier.

5. The method of claim 4 further comprising reprogramming at least one of the frequency band of the filter and the gain of the amplifier after amplifying the filtered second signal.

6. The method of claim 1 wherein the reception of the first signal comprises filtering the received first signal with a filter, and the programming comprises programming a frequency band of the filter.

7. The method of claim 1 wherein the reception of the first signal comprises amplifying the received first signal with an amplifier, and the programming comprises programming gain of the amplifier.

8. The method of claim 1 wherein the reception of the first signal comprises demodulating the received first signal with a demodulator, and the programming comprises programming a demodulation for the demodulator.

9. The method of claim 1 wherein the reception of the first signal comprises amplifying the received first signal with an amplifier, filtering the amplified first signal with a filter, and demodulating the filtered first signal with a demodulator, and wherein the programming comprises programming gain of the amplifier, a frequency band of the filter, and a demodulation for the demodulator.

10. The method of claim 9 further comprising reprogramming at least one of the gain of the amplifier, the frequency band of the filter and the demodulation for the demodulator after the filtered first signal is demodulated.

11. The method of claim 9 wherein the transmission of the second signal comprises filtering the second signal with a second filter and amplifying the filtered second signal with a second amplifier, and wherein the programming further comprises programming a frequency band of the second filter and programming gain of the second amplifier.

12. The method of claim 11 further comprising reprogramming at least one of the gain of the amplifier, the frequency band of the filter, and the demodulation for the demodulator after the demodulating the filtered first signal, and reprogramming at least one of the frequency band of the second filter, and the gain of the second amplifier after amplifying the filtered second signal.

13. The method of claim 1 further comprising downconverting the received first signal.

14. The method of claim 13 wherein the downconversion comprises mixing the received first signal with a clock.

15. The method of claim 14 further comprising generating the clock by mixing a second clock with a third clock.

16. The method of claim 15 further comprising generating the third clock by dividing the second clock by an integer N.

17. The method of claim 16 wherein the clock comprises a frequency f_{LO} equal to f_{VCO} (N+1) / N, wherein f_{VCO} equals a frequency of the second clock.

18. The method of claim 17 wherein N = 2.

19. The method of claim 1 further comprising upconverting the second signal before transmission into space.

20. The method of claim 19 wherein the upconversion comprises mixing the second signal with a clock.

21. The method of claim 20 further comprising generating the clock by mixing a second clock with a third clock.

22. The method of claim 21 further comprising generating the third clock by dividing the second clock by an integer N.

23. The method of claim 22 wherein the clock comprises a frequency f_{LO} equal to f_{VCO} (N+1) / N, wherein f_{VCO} equals a frequency of the second clock.

24. The method of claim 23 wherein N = 2.

25. The method of claim 1 wherein the transmitter and receiver each have a component, the method further comprising calibrating one of the transmitter and receiver components.

26. The method of claim 25 wherein one of the components comprises a resistor.

27. The method of claim 25 wherein one of the components comprises a capacitor.

28. The method of claim 25 wherein the calibration comprises calibrating the receiver component before the first signal is received, the method further comprising recalibrating the receiver component after the first signal is received.

29. The method of claim 25 wherein the calibration comprises calibrating the transmitter component before the second signal is transmitted, the method further comprising recalibrating the transmitter component after the second signal is transmitted.

30. The method of claim 25 further comprising coupling test data to said one of the transmitter and receiver with the calibrated component, and monitoring an output thereof.

31. The method of claim 30 further comprising recalibrating said one of the transmitter and receiver with the calibrated component, coupling the test data thereto, and monitoring the output thereof.

32. A method of wireless communications using a transceiver having a receiver, transmitter and local oscillator, comprising:

programming a frequency of a clock in the local oscillator;
receiving a first signal at the receiver from a wireless source;
downconverting the received first signal with the clock;
upconverting a second signal with the clock; and
transmitting the upconverted second signal from the transmitter into space.

33. The method of claim 32 further comprising amplifying the received first signal with an amplifier, and programming gain of the amplifier.

34. The method of claim 32 wherein the received first signal is downconverted to an intermediate frequency signal.

35. The method of claim 34 further comprising filtering the intermediate frequency signal with a filter, and programming a frequency band of the filter.

36. The method of claim 34 further comprising downconverting the intermediate frequency signal to a baseband signal.

37. The method of claim 36 further comprising demodulating the baseband signal with a demodulator, and programming a demodulation for the demodulator.

38. The method of claim 32 wherein the programming of the clock frequency comprising mixing a second clock with a third clock.

39. The method of claim 38 further comprising generating the third clock by dividing the second clock by an integer N.

40. The method of claim 39 wherein the clock frequency f_{LO} is equal to f_{VCO} (N+1) / N, wherein f_{VCO} equals a frequency of the second clock.

41. The method of claim 40 wherein N = 2.

42. The method of claim 32 further comprising amplifying the upconverted first signal with an amplifier before transmitting the upconverted first signal into space, and programming gain of the amplifier.

43. The method of claim 32 further comprising filtering the first signal with a filter, and programming a frequency band of the filter.

44. The method of claim 32 wherein the transmitter and receiver each have a component, the method further comprising calibrating one of the transmitter and receiver components.

45. The method of claim 44 wherein one of the components comprises a resistor.

46. The method of claim 44 wherein one of the components comprises a capacitor.

47. The method of claim 44 wherein the calibration comprises calibrating the receiver component before the first signal is received, the method further comprising recalibrating the receiver component after the first signal is received.

48. The method of claim 44 wherein the calibration comprises calibrating the transmitter component before the second signal is transmitted, the method further comprising recalibrating the transmitter component after the second signal is transmitted.

49. The method of claim 44 further comprising coupling test data to said one of the transmitter and receiver with the calibrated component, and monitoring an output thereof.

50. The method of claim 49 further comprising recalibrating said one of the transmitter and receiver with the calibrated component, recoupling the test data thereto, and remonitoring the output thereof.

51. An adaptive transceiver, comprising:
a receiver having programmable component;
a transmitter coupled to the receiver and having a programmable component; and
a controller to program one of the receiver and transmitter components.

52. The adaptive transceiver of claim 51 wherein the receiver component comprises a filter having a programmable frequency band.

53. The adaptive transceiver of claim 51 wherein the receiver component comprises an amplifier having a programmable gain.

54. The adaptive transceiver of claim 51 wherein the receiver component comprises a demodulator with programmable demodulation.

55. The adaptive transceiver of claim 51 wherein the receiver component comprises an amplifier having a programmable gain, and the receiver further comprises a filter coupled to the amplifier and having a programmable frequency band, and a demodulator coupled to the filter and having programmable demodulation.

56. The adaptive transceiver of claim 51 wherein the transmitter component comprises a filter having a programmable frequency band.

57. The adaptive transceiver of claim 51 wherein the transmitter component comprises an amplifier having a programmable gain.

58. The adaptive transceiver of claim 51 wherein the transmitter component comprises a filter having a programmable frequency band, and an amplifier coupled to the filter and having a programmable gain.

59. The adaptive transceiver of claim 58 wherein the receiver component comprises a second amplifier having a programmable gain, and the receiver further comprises a second filter coupled to the second amplifier and having a programmable frequency band, and a demodulator coupled to the second filter and ~~having~~ programmable demodulation.

60. The adaptive transceiver of claim 51 further comprising an local oscillator coupled to the receiver and transmitter.

61. The adaptive transceiver of claim 60 wherein the local oscillator comprises a clock generator which outputs a clock to ~~the~~ receiver and transmitter.

62. The adaptive transceiver of claim 61 wherein the transmitter comprises a mixer to mix the clock with a baseband signal.

63. The adaptive transceiver of claim 62 wherein the transmitter further comprises an amplifier coupled to the mixer, the amplifier being the programmable transmitter component.

64. The adaptive transceiver of claim 62 wherein the transmitter further comprises a filter coupled to the mixer, the filter being the programmable transmitter component.

65. The adaptive transceiver of claim 61 wherein the transmitter component comprises a filter with a programmable frequency band to filter a baseband signal, and wherein the transmitter

further comprises a mixer coupled to the filter to mix the clock with the filtered baseband signal, and an amplifier coupled to the mixer and having a programmable gain.

66. The adaptive transceiver of claim 61 wherein the receiver comprises a mixer to mix the clock with a received signal from a wireless source.

67. The adaptive transceiver of claim 66 wherein the receiver further comprises an amplifier coupled to the mixer, the amplifier being the programmable receiver component.

68. The adaptive transceiver of claim 66 wherein the receiver further comprises a filter coupled to the mixer, the filter being the programmable receiver component.

69. The adaptive transceiver of claim 66 wherein the receiver further comprises a demodulator coupled to the mixer, the demodulator being the programmable receiver component.

70. The adaptive transceiver of claim 61 wherein the receiver component comprises an amplifier having a programmable gain to amplify a received signal from an external wireless source, and wherein the receiver further comprises a first mixer coupled to the amplifier to mix the amplified received signal with the clock, a filter coupled to the first mixer and having a programmable frequency band, a second mixer coupled to the filter, and a demodulator coupled to the filter and having programmable demodulation.

71. The adaptive transceiver of claim 70 wherein the transmitter component comprises a second filter with a programmable frequency band to filter a baseband signal, and wherein the transmitter further comprises a third mixer coupled to the second filter to mix the clock with the filtered baseband signal, and a second amplifier coupled to the third mixer and having a programmable gain.

72. The adaptive transceiver of claim 61 wherein the local oscillator comprises a second clock generator which outputs a second clock to the receiver.

73. The adaptive transceiver of claim 72 wherein the second clock generator comprises an oscillator and a divider coupled to the oscillator, the divider having a control input coupled to the controller to program a frequency of the second clock.

74. The adaptive transceiver of claim 61 wherein the clock generator comprises a voltage controlled oscillator to generate the clock, the voltage controlled oscillator a having frequency different than a frequency of the clock.

75. The adaptive transceiver of claim 74 wherein the clock generator further comprises a divider coupled to the voltage controlled oscillator, and a mixer coupled to both the divider and the voltage controlled oscillator, the mixer having an output comprising the clock to the transmitter and receiver.

76. The adaptive transceiver of claim 75 wherein the divider further comprises a control input coupled to the controller to program the frequency of the clock.

77. The adaptive transceiver of claim 75 wherein the clock generator further comprises a phase lock loop comprising the voltage controlled oscillator, the phase lock loop having a control input coupled to the controller to program the frequency of the voltage controlled oscillator.

78. The adaptive transceiver of claim 51 wherein the transmitter and receiver each have a second component, and the controller is configured to calibrate one of the second components of the transmitter and receiver.

79. The adaptive transceiver of claim 78 wherein one of the second components comprises a resistor.

80. The adaptive transceiver of claim 78 wherein one of the second components comprises a capacitor.

81. The adaptive transceiver of claim 78 wherein the controller is configured to calibrate the second component of the transmitter.

82. The adaptive transceiver of claim 78 wherein the controller is configured to calibrate the second component of the receiver.

83. The adaptive transceiver of claim 78 wherein the controller is configured to calibrate the second components of both the receiver and transmitter.

84. The adaptive transceiver of claim 78 further comprising a self testing unit coupled to the receiver and transmitter, the self testing unit being configured to coupled test data to one of the receiver and transmitter, and monitor an output thereof.

85. An adaptive transceiver, comprising:

means for receiving a first signal from an external wireless source;

means for transmitting a second signal into space; and

means for programming one of the receiving means and transmitting means.

86. The adaptive transceiver of claim 85 wherein the transmitting means comprises means for filtering the second signal, and the programming means programs a frequency band of the filtering means.

87. The adaptive transceiver of claim 85 wherein the transmitting means comprises means for amplifying the second signal, and the programming means programs gain of the amplifying means.

88. The adaptive transceiver of claim 85 wherein the transmitting means comprises means for filtering the second signal, and means for amplifying the filtered second signal, and wherein the programming means programs both a frequency band of the filtering means and gain of the amplifying means.

89. The adaptive transceiver of claim 85 wherein the receiving means comprises means for filtering the received first signal, and the programming means programs a frequency band of the filtering means.

90. The adaptive transceiver of claim 85 wherein the receiving means comprises means for amplifying the received first signal, and the programming means programs gain of the amplifying means.

91. The adaptive transceiver of claim 85 wherein the receiving means comprises means for demodulating the received first signal, and the programming means programs demodulation for the demodulating means.

92. The adaptive transceiver of claim 85 wherein the receiving means comprises means for amplifying the received first signal, means for filtering the amplified first signal, and means for demodulating the filtered first signal, and wherein the programming means programs gain of the amplifying means, a frequency band of the filtering means, and demodulation for the demodulating means.

93. The adaptive transceiver of claim 92 wherein the transmitting means comprises second means for filtering the second signal, and second means for amplifying the filtered second signal, and wherein the programming means programs a frequency band of the second filtering means and gain of the second amplifying means.

94. The adaptive transceiver of claim 85 further comprising means for downconverting the received first signal.

95. The adaptive transceiver of claim 94 wherein the downconverting means comprises means for mixing the received first signal with a clock.

96. The adaptive transceiver of claim 95 further comprising means for generating the clock by mixing a second clock with a third clock.

97. The adaptive transceiver of claim 96 further comprising means for generating the third clock by dividing the second clock by an integer N.

98. The adaptive transceiver of claim 97 wherein the clock comprises a frequency f_{LO} equal to f_{VCO} (N+1) / N, wherein f_{VCO} equals a frequency of the second clock.

99. The adaptive transceiver of claim 98 wherein N = 2.

100. The adaptive transceiver of claim 85 further comprising means for upconverting the second signal before transmission into space.

101. The adaptive transceiver of claim 100 wherein the upconverting means comprises means for mixing the second signal with a clock.

102. The adaptive transceiver of claim 101 further comprising means for generating the clock by mixing a second clock with a third clock.

103. The adaptive transceiver of claim 102 further comprising means for generating the third clock by dividing the second clock by an integer N.

104. The adaptive transceiver of claim 103 wherein the clock comprises a frequency f_{LO} equal to f_{VCO} (N+1) / N, wherein f_{VCO} equals a frequency of the second clock.

105. The adaptive transceiver of claim 104 wherein N = 2.

106. The adaptive transceiver of claim 85 wherein the transmitting means and receiver means each have a component, the adaptive transceiver further comprising means for calibrating one of the components of the transmitting and receiving means.

107. The adaptive transceiver of claim 106 wherein one of the components comprises a resistor.

108. The adaptive transceiver of claim 106 wherein one of the components comprises a capacitor.

109. The adaptive transceiver of claim 106 the calibrating means is configured to calibrate the component of the transmitting means.

110. The adaptive transceiver of claim 106 the calibrating means is configured to calibrate the component of the receiving means.

111. The adaptive transceiver of claim 106 further comprising means for testing said one of the transmitting and receiving means with the calibrated component by coupling test data thereto and monitoring an output thereof.

112. A adaptive transceiver, comprising:
means for receiving a first signal from a wireless source;
means for downconverting the received first signal with a clock;
means for upconverting a second signal with the clock;
means for transmitting the upconverted second signal into space; and
means for programming a frequency of the clock.

113. The adaptive transceiver of claim 121 further comprising means for amplifying the received first signal, and means for programming gain of the amplifying means.

114. The adaptive transceiver of claim 121 wherein the downconverting means downconverts the received first signal to an intermediate frequency signal.

115. The adaptive transceiver of claim 123 further comprising means for filtering the intermediate frequency signal, and means for programming a frequency band of the filtering means.

116. The adaptive transceiver of claim 123 further comprising means for downconverting the intermediate frequency signal to a baseband signal.

117. The adaptive transceiver of claim 125 further comprising means for demodulating the baseband signal, and means programming demodulation for the demodulation means.

118. The adaptive transceiver of claim 121 wherein the clock frequency programming means comprises means for mixing a second clock with a third clock.

119. The adaptive transceiver of claim 127 wherein the clock frequency programming means further comprises means for generating the third clock by dividing the second clock by an integer N.

120. The adaptive transceiver of claim 128 wherein the clock frequency f_{LO} is equal to f_{VCO} (N+1) / N, wherein f_{VCO} equals a frequency of the second clock.

121. The adaptive transceiver of claim 129 wherein N = 2.

122. The adaptive transceiver of claim 121 further comprising means for amplifying the upconverted first signal before transmitting the upconverted first signal into space, and means for programming gain of the amplifying means.

123. The adaptive transceiver of claim 121 further comprising means for filtering the first signal, and means for programming a frequency band of the filtering means.

124. The adaptive transceiver of claim 121 wherein the transmitting and receiving means each have a component, the adaptive transceiver further comprising means for calibrating one of the components of the transmitting and receiving means.

125. The adaptive transceiver of claim 131 wherein one of the components comprises a resistor.

126. The adaptive transceiver of claim 131 wherein one of the components comprises a capacitor.

127. The adaptive transceiver of claim 131 wherein the calibrating means is configured to calibrate the component of the transmitting means.

128. The adaptive transceiver of claim 131 wherein the calibrating means is configured to calibrate the component of the receiving means.

129. The adaptive transceiver of claim 131 further comprising means for testing one of the receiving and transmitting means by coupling test data thereto and monitoring an output thereof.

130. An integrated circuit, comprising:

a receiver having programmable component;

a transmitter having a programmable component; and

a controller to program one of the receiver and transmitter components.

131. The integrated circuit of claim 137 wherein the receiver component comprises a filter having a programmable frequency band.

132. The integrated circuit of claim 137 wherein the receiver component comprises an amplifier having a programmable gain.

133. The integrated circuit of claim 137 wherein the receiver component comprises a demodulator with programmable demodulation.

134. The integrated circuit of claim 137 wherein the receiver component comprises an amplifier having a programmable gain, and the receiver further comprises a filter coupled to the amplifier and having a programmable frequency band, and a demodulator coupled to the filter and having programmable demodulation.

135. The integrated circuit of claim 137 wherein the transmitter component comprises a filter having a programmable frequency band.

136. The integrated circuit of claim 137 wherein the transmitter component comprises an amplifier having a programmable gain.

137. The integrated circuit of claim 137 wherein the transmitter component comprises a filter having a programmable frequency band, and an amplifier coupled to the filter and having a programmable gain.

138. The integrated circuit of claim 144 wherein the receiver component comprises a second amplifier having a programmable gain, and the receiver further comprises a second filter coupled to the second amplifier and having a programmable frequency band, and a demodulator coupled to the second filter and having programmable demodulation.

139. The integrated circuit of claim 137 further comprising an local oscillator coupled to the receiver and transmitter.

140. The integrated circuit of claim 146 wherein the local oscillator comprises a clock generator which outputs a clock to the receiver and transmitter.

141. The integrated circuit of claim 147 wherein the transmitter comprises a mixer to mix the clock with a baseband signal.

142. The integrated circuit of claim 148 wherein the transmitter further comprises an amplifier coupled to the mixer, the amplifier being the programmable transmitter component.

143. The integrated circuit of claim 148 wherein the transmitter further comprises a filter coupled to the mixer, the filter being the programmable transmitter component.

144. The integrated circuit of claim 147 wherein the transmitter component comprises a filter with a programmable frequency band to filter a baseband signal, and wherein the transmitter further comprises a mixer coupled to the filter to mix the clock with the filtered baseband signal, and an amplifier coupled to the mixer and having a programmable gain.

145. The integrated circuit of claim 147 wherein the receiver comprises a mixer to mix the clock with a received signal from a wireless source.

146. The integrated circuit of claim 152 wherein the receiver further comprises an amplifier coupled to the mixer, the amplifier being the programmable receiver component.

147. The integrated circuit of claim 152 wherein the receiver further comprises a filter coupled to the mixer, the filter being the programmable receiver component.

148. The integrated circuit of claim 152 wherein the receiver further comprises a demodulator coupled to the mixer, the demodulator being the programmable receiver component.

149. The integrated circuit of claim 147 wherein the receiver component comprises an amplifier having a programmable gain to amplify a received signal from an external wireless source, and wherein the receiver further comprises a first mixer coupled to the amplifier to mix the amplified received signal with the clock, a filter coupled to the first mixer and having a programmable frequency band, a second mixer coupled to the filter, and a demodulator coupled to the filter and having programmable demodulation.

150. The integrated circuit of claim 156 wherein the transmitter component comprises a second filter with a programmable frequency band to filter a baseband signal, and wherein the transmitter further comprises a third mixer coupled to the second filter to mix the clock with the filtered baseband signal, and a second amplifier coupled to the third mixer and having a programmable gain.

151. The integrated circuit of claim 147 wherein the local oscillator comprises a second clock generator which outputs a second clock to the receiver.

152. The integrated circuit of claim 158 wherein the second clock generator comprises an oscillator and a divider coupled to the oscillator, the divider having a control input coupled to the controller to program a frequency of the second clock.

153. The integrated circuit of claim 147 wherein the clock generator comprises a voltage controlled oscillator to generate the clock, the voltage controlled oscillator a having frequency different than a frequency of the clock.

154. The integrated circuit of claim 160 wherein the clock generator further comprises a divider coupled to the voltage controlled oscillator, and a mixer coupled to both the divider and the voltage controlled oscillator, the mixer having an output comprising the clock to the transmitter and receiver.

155. The integrated circuit of claim 161 wherein the divider further comprises a control input coupled to the controller to program the frequency of the clock.

156. The integrated circuit of claim 161 wherein the clock generator further comprises a phase lock loop comprising the voltage controlled oscillator, the phase lock loop having a control input coupled to the controller to program the frequency of the voltage controlled oscillator.

157. The integrated circuit of claim 137 wherein the transmitter and receiver each have a second component, and the controller is configured to calibrate one of the transmitter and receiver second components.

158. The integrated circuit of claim 164 wherein the second component comprises a resistor.

159. The integrated circuit of claim 164 wherein the second component comprises a capacitor.

160. The integrated circuit of claim 164 wherein the controller is configured to calibrate the transmitter second component.

161. The integrated circuit of claim 164 wherein the controller is configured to calibrate the receiver second component.

162. The integrated circuit of claim 164 wherein the controller is configured to calibrate both the receiver and transmitter second components.

163. The integrated circuit of claim 164 further comprising a self testing unit coupled to the receiver and transmitter, the self testing unit being configured to coupled test data to one of the receiver and transmitter, and monitor an output thereof.

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